Energy Efficiency Question 14: *What methods for measuring costs and benefits (e.g. Utility Resource Cost Test or Total Resource Cost) have been proposed or used by various jurisdictions, and what is the effect of using one method over another? Are annual savings or predicted lifecycle levelized costs used more often, and what effect does selecting one option over another have?*

Executive summary

1. All tests used typically originate from the California Standard Practices Manual. Benefits are based on annual savings over a measure's lifetime, discounted over time.
   - The California Standard Practices Manual (California Manual) serves as the general standard of cost-effectiveness analysis in the United States (CPUC 2001), offering guidelines for measuring the cost-effectiveness of utility sponsored programs when using five different tests.

2. The Utility System Resource Cost Test (USRCT), also known as PACT and UCT, is a credible measurement of energy optimization program cost effectiveness and is the primary measure used in Michigan to determine the cost effectiveness of an energy optimization provider program.
   - The USRCT provides an investment ratio comparing long term avoided power supply costs to the costs of implementing the energy optimization program.
   - A score of 1.0 or greater in this test (benefits are equal to or greater than the costs) indicate a cost effective program.
   - Although there are other methods to score cost effectiveness including the Total Resource Cost (TRC), Participant Cost Test (PT), Rate Impact Measure (RIM), and Societal Cost Test (SCT), the USRCT is most practical and straightforward to implement.

3. Each Michigan energy optimization provider calculates the USRCT for its energy optimization portfolio annually and provides this data to the MPSC in its energy optimization reconciliation filing. To date, the commission has concluded that Michigan energy optimization programs are cost effective.
   - Providers perform USRCT calculations in planning an energy optimization program and the USRCT score is included in the provider's energy optimization plan submitted to the commission for approval.
   - Providers calculate the USRCT at the end of each year, evaluating the cost effectiveness of the actual savings and costs of the program year. Results are reported to the commission in an annual reconciliation case.
   - Since 2009, the commission has issued annual Michigan reports on the state of energy optimization each year. For program years 2010 and 2011, energy

optimization programs were declared cost effective. In 2011, every dollar spend on energy optimization led to $3.55 in savings.

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1. All tests used typically originate from the California Standard Practices Manual. Benefits are based on annual savings over a measure's lifetime, discounted over time.

The California Standard Practices Manual (California Manual)[1] serves as the general standard of cost-effectiveness analysis in the United States (CPUC 2001), offering guidelines for measuring the cost-effectiveness of utility sponsored programs using the following five tests:

- **Total Resource Cost Test (TRC).** Originally known as the All-Ratepayer Test, this test examines efficiency from the viewpoint of an entire service territory. This test compares the program benefits of avoided power supply costs to costs of administering a program and upgrading equipment, including customer's contributions. When a program passes the TRC, this indicates total resource costs will drop, and the total cost of energy services for an average customer will fall.

- **Ratepayer Impact Test (RIM).** Originally known as the Nonparticipant Test, RIM is also known as the "no losers test." The RIM tests cost-effectiveness from the viewpoint of a utility's customers as a whole, measuring distributional impacts of conservation programs. The test measures what happens to average price levels due to changes in utility revenues and operating costs caused by a program. A benefit/cost ratio less than 1.0 indicates the program will increase prices for all customers. For a program passing the TRC but failing the RIM, average prices will increase even though average costs will decrease, resulting in higher energy service costs for customers not participating in the program.

- **Utility System Resource Cost Test (USRCT)[2].** Also known as the Program Administrator Test (PACT) and the Utility Cost Test (UCT), this test measures cost-effectiveness from the viewpoint of the sponsoring utility or program administrator. If avoided supply costs exceed costs incurred by the program administrator, average costs decrease. The USRCT ensures that all programs

[1] Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects.
[2] The 2001 version of the California Standard Practices Manual the USRCT was renamed Program Administrators Cost Test (PACT), but the test continues to be referred to as USRCT or UCT in Michigan.

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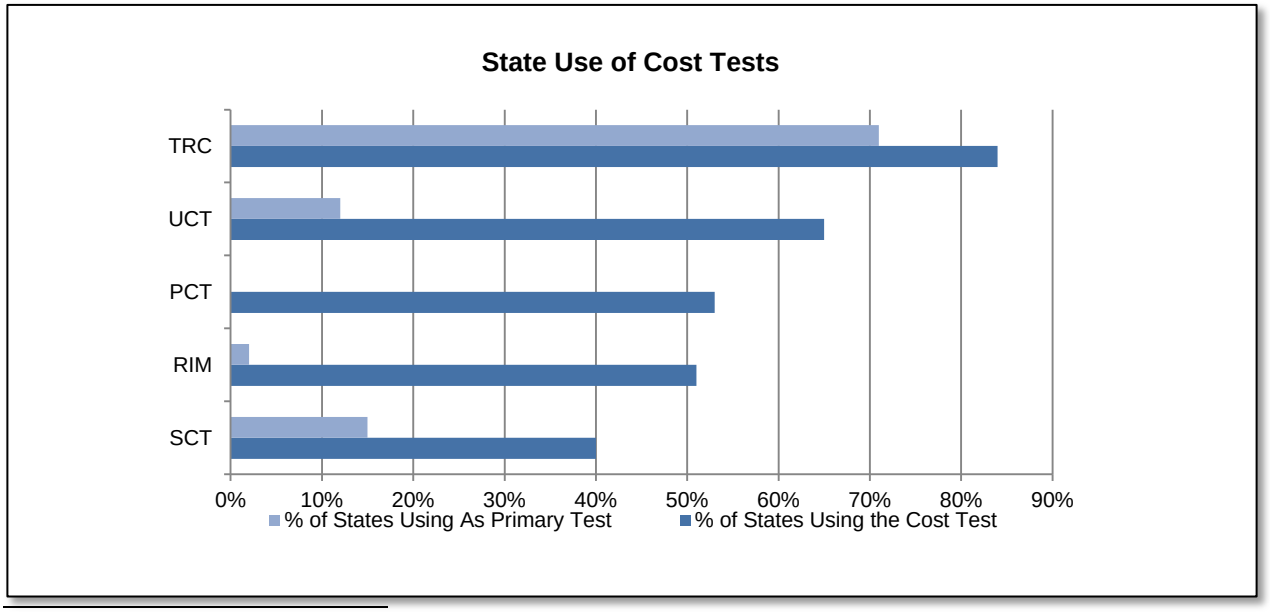
are cost-effective from the perspective of the utility or program administrator and that the benefits to ratepayers will exceed the costs.[3]

- **Participant Cost Test (PCT).** This test measures benefits and costs to customers participating in demand-side management (DSM) programs. The test compares bill savings against incremental costs of the efficient equipment. It measures a program's economic attractiveness to customers, and can be used to set rebate levels and forecast participation.

- **Societal Cost Test (SCT).** A variation of the TRC, this test expands the point-of-view from the service territory to society's perspective. The TRC and the SCT differ in two important aspects: 1) while the TRC uses an average cost of capital discount rate, the SCT uses a societal discount rate; and 2) the SCT includes all quantifiable benefits attributable to the program, such as avoided pollutants, water savings, detergent savings, and other non-energy benefits.

All of the cost tests outlined in this section are used across the country. The most widely used is the TRC test. USRCT is the second most used test, and 12% of the states use it today as the primary cost test. The chart below shows the cost tests and their use across the United States[4]. The darker bar indicates if the cost test is used at all, and the lighter bar indicates if it is the primary cost test.



[3] Chris Neme and Martin Kushler, *Is it Time to Ditch the TRC? Examining Concerns with Current Practice in Benefit-Cost Analysis,* Proceeding from the 2010 ACEEE Summer Study on Energy Efficiency in Buildings, August 2010, http://www.aceee.org/proceedings-paper/ss10/panel05/paper06

[4] *A National Survey of State Policies and Practices for the Evaluation of Ratepayer Funded Energy Efficiency Programs*, Martin Kushler, Seth Nowak, and Patti Witte, February 2012.

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The table below shows the various components in different cost test calculations.[5]

Benefits and Costs by Cost-Effectiveness Test

	PCT	RIM	TRC	SCT	UCT
Benefits					
Primary Fuel(s) Avoided Supply Costs		✓	✓	✓	✓
Secondary Fuel(s) Avoided Supply Costs			✓	✓	
Primary Fuel(s) Bill Savings (retail prices)	✓				
Secondary Fuel(s) Bill Savings (retail prices)	✓				
Other Resource Savings (e.g. water)	✓		✓	✓	
Environmental Benefits				✓	
Other non-energy benefits			✓	✓	
Costs					
Program Administration		✓	✓	✓	✓
Program Financial Incentives		✓	✓	✓	✓
Customer Contributions	✓		✓	✓	
Utility Lost Revenues		✓			

✓ -included in the test ✓ - rarely included or in theory only

2. The Utility System Resource Cost Test (USRCT), also known as PACT and UCT, is a credible measurement of energy optimization program cost effectiveness and is the primary measure used in Michigan to determine the cost effectiveness of an energy optimization provider program.

The current method that Michigan energy optimization providers use to evaluate cost effectiveness is the Utility System Resource Cost. This test compares the ratio of the benefits of avoided power supply costs attributable to the energy efficiency program to the costs of implementing the program. According to the American Council for an Energy-Efficient Economy (ACEEE), the PACT or the USRCT measures the following:

> *The Program Administrator Cost Test (previously known as the Utility Cost Test) measures cost effectiveness from a utility perspective. It compares the value of the*

[5] Kushler, Nowak and Witte

utility's avoided costs with the cost to the utility of acquiring the efficiency resources that produce those avoided costs.[6]

Benefits in this calculation are compiled based on aggregating the energy savings of all technologies and approaches implemented in the energy optimization plan and estimating the power supply costs avoided due to those savings. This approach to calculating avoided cost benefit is a "bottoms up" approach in evaluating cost effectiveness.

Costs in the USRCT calculation are simply the utility costs to implement the program. These costs generally include the incremental costs to run the program such as administration costs, marketing costs, and rebate and incentive costs. While the benefit component of the calculation considers avoided costs over the estimated lifecycle of the technologies implemented, often for years into the future, the cost component of the calculation only considers program costs in the years in which the program is being evaluated. Thus, the calculation is similar to a net present value calculation that evaluates the financial benefit of an investment and the future stream of cash flows relative to that initial investment.

The calculation of the USRCT is done by simply taking the net present value of the avoided power supply costs divided by the net present value of the program costs. If the ratio is 1.0 or greater, the evaluated energy optimization program is deemed cost effective. The test is relatively simple to develop and calculate given general utility costs and power supply forecasts.

There is no national consensus on which test is the best for measuring energy efficiency programs. While many utilities use the TRC test, the elements that are measured in the TRC vary widely. However, every state uses some measure of "utility system avoided costs" as a benefit, and every state treats "energy efficiency program costs" as a cost[6]. The USRCT has the advantage of being simpler and much less expensive to calculate, given that the inputs are data that the utility generally already has. The USRCT also incorporates energy efficiency as a supply side investment similar to how other utility decisions are made.

[6] Is it Time to Ditch the TRC? Examining Concerns with Current Practice in Benefit-Cost Analysis, Chris Neme, Energy Futures Group, Marty Kushler, American Council for an Energy-Efficient Economy, 2010 ACEEE Summer Study on Energy Efficient Buildings.

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3. Each Michigan energy optimization provider calculates the USRCT for its energy optimization portfolio annually and provides this data to the MPSC in its energy optimization reconciliation filing. To date, the Commission has concluded that Michigan energy optimization programs are cost effective.

Current Michigan energy legislation requires that all utilities or their energy efficiency program administrators submit an energy optimization plan for their service territories to the Commission for approval. The plan length must encompass between 2 and 6 years of energy optimization programs and must be cost effective according to the UCT cost test. Thus, in Michigan, data is available for all energy optimization plans for all electric and gas investor owned utilities, municipal utilities and cooperative utilities. Plan cases can be researched in the energy efficiency section on the commission's web site at www.michigan.gov/mpsc. Energy optimization plan submittals often provide details on cost effectiveness of individual programs within the overall plan portfolio, providing insights to cost effectiveness of different bundles of technologies and program approaches.

At the end of each program year, energy optimization providers must submit an annual report to the commission providing details of the programs completed. Investor owned utilities and cooperatives must also file a reconciliation of the program year's energy savings and program spending. In these reports and filings, providers address results of the program savings (verified by a third party evaluator), program costs and the UCT calculation for the program year. Annual reports and reconciliation filings can also be researched in the energy efficiency section on the commission's web site at www.michigan.gov/mpsc.

Each year, the commission produces a state-wide summary of all energy optimization programs, discussing progress of the providers in achieving energy savings requirements, costs of the programs and the cost effectiveness of the programs. These reports can be found under the EO Implementation Reports link in the energy efficiency section of the website www.michigan.gov/mpsc. For program years 2010 and 2011, the commission specifically provided the summary of the costs and benefits (referred to as lifecycle savings) of the provider's programs. The table below summarizes these statistics:

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Program Year	Program Spending	Lifecycle Savings	Savings per Dollar Spent	Commission Report Title
2010[7]	$113 Million	$554 Million	$4.88	2011 REPORT ON THE IMPLEMENTATION OF P.A. 295 UTILITY ENERGY OPTIMIZATION PROGRAMS
2011[8]	$205 Million	$709 Million	$3.55	2012 REPORT ON THE IMPLEMENTATION OF P.A. 295 UTILITY ENERGY OPTIMIZATION PROGRAMS

The commission's reports in 2010 and 2011 have concluded that Michigan's energy efficiency programs collectively represent a cost effective investment for the state. The 2012 final data will not be available until verification of spend and savings is finalized by independent auditors. The commission's report for 2012 is expected to be available in Q3 or Q4 of 2013.

[7] includes DTE Energy and Consumers Energy details in the cost effectiveness calculation
[8] includes DTE Energy, Consumers Energy and Efficiency United programs or about 90% of the state's energy efficiency